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STANDARDIZATION AND UNIFICATION
OF METALLURGICAL EQUIPMENT AND SPECIALIZATION
IN HEAVY-MACHINE-BUILDING PLANTS

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Heavy-machine-building plants must increase the output of metallurgical equipment four times in 1950 in comparison with 1940. Rolled-stock equipment will receive the greatest attention. During the years of the postwar Five-Year Plan, it is necessary to bring into use a considerable number of rolling mills, including many new high-duty combination units which were neither designed nor manufactured previously. Included among these are skelp mills, rail and structural-steel mills, wheel-rolling mills, tube mills, combination mills, 800- and 650-millimeter heavy section mills, continuous billet mills, alternate (shakmatnyye) light section mills, tin-plate mills, pipe-welding mills and others. In this connection the plants and the Central Designing Bureau of the Ministry of Heavy Machine Building must do a great deal of work. Only a small number of machines for blast furnace, open hearth and crane equipment will need redesigning since standardized units and parts can be used. A huge volume of work remains to be done, however, in designing and producing rolled-stock equipment.

Series production is considerably more effective than unit production. There are two ways to achieve this goal. One is extensively to standardize and unify machines and single units; the other is to introduce strict plant specialization.

The purpose of standardization is to limit voluntary selection of basic machine specifications and designs and to fix them as invariable for a given type and size of machine. There is no need to become apprehensive that such inflexibility of machine design might become an obstacle to its modernization. In such a case, if it is necessary, the old type can be renovated or replaced by a new one.

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Metallurgical machine-building plants are producing an extremely large variety of machines. Since the majority of specifications are selected in accordance with regular orders, they have a haphazard character. The designs of a number of machines, in particular those which are seldom reordered have already become obsolete. Therefore, neither the specifications nor designs of existing machines can serve as a basis for standardization. This problem can be worked out gradually by standardization groups of the designing bureau according to a uniform plan, developed by the TsKMM and approved by the Ministry of Heavy Machine Building.

The following two steps are necessary to standardization: (1) working out and fixing the basic specifications of the machine along with establishing the series of types and sizes, and (2) working out the designs of the machines within the ranges of the fixed series.

The first step must be carried out in the shortest possible time. The second step, which is extremely labor-consuming, can be fulfilled by plants according to the amount of machine orders received.

The second step can be broken down into several phases. First of all, parts and units for general purposes can be standardized so that they can be used as a basis for developing standards on machines for all types of standardized metallurgical equipment. The interchange of drawings among plants has great importance. However, the main obstacle is the diversity of symbols used on the drawings by different plants.

The first measure to be taken as soon as possible in solving this problem is developing a system whereby the drafting of parts for general purposes will be uniform for all plants.

The next phase is to standardize equipment for technological processes which have already been fixed and do not have a large number of diversities. This can include blast-furnace, steel-smelting, crushing and pulverizing, and sintering equipment, as well as equipment for coke batteries.

Special-purpose equipment now being produced by plants is fully meeting demands. Therefore, this equipment can be used as a basis for developing standard designs which will bring about greater accuracy in a series of machine types and sizes and improvement in some designs. Thus, the second phase of the second step in standardization involves a limited volume of work and can be accomplished in a comparatively short time.

In the final phase it is necessary to standardize all other special equipment such as rolling, forging and pressing, and lifting and conveying. Here, the length of time between standardizing basic specifications and completion of standardized machine designs will be prolonged. The development of standardized designs, due to the huge volume of work, can only be done gradually in accordance with the amount of orders received for the equipment.

The standardization of rolling-mill equipment will be particularly laborious in view of its great diversities, wide variety of the rolling technological process for one purpose or another, and the close dependence of one part on another. However, independent secondary machines such as shears for various purposes, saws, roller-straightening machines, payoff reels, take-up reels, doubles, (dublers), and others, can be standardized in the first step.

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For standardizing the remaining rolling equipment it is expedient to segregate separate units and parts according to all categories of rolling mills and to determine their basic dimensions and series of types and sizes. In this way, gear casings (kleti), spindles, main clutches, roller shafts, clamping screws and their nuts, table rollers, and bevel gears for rollers can be standardized.

Unification of metallurgical equipment is understood as the wide introduction of the same machines and their units into various combination or rolling mills. For example, plans for a 1,000-millimeter bloom were worked out by the TsKBMM and were successfully applied at the Novo-Kramatorsk Plant imeni Stalin in the construction of a skelp mill for the Transcaucasian Plant. In both cases the same units were used with slight changes of roller stands, gear casings, spindles, tables, shears, etc. Due to unification, the time required for designing and manufacturing mills was considerably shortened.

Similar unification could be brought about when designing pipe-rolling mills at the Novo-Kramatorsk Plant and rail and structural-steel mills at the Uralmash Plant if the necessary coordination between these two plants could be set up.

At present, plants which produce metallurgical equipment are specialized for one or another type of equipment such as blast furnace, steel smelting, etc. Such specialization is absolutely necessary; in the final analysis it increases production and improves the quality of machines.

However, for further rapid increase in metallurgical equipment production, such specialization is now inadequate.

Standard units and parts which recur in large numbers in various machines are found in metallurgical equipment. The production of such standard units must be concentrated at specified plants which would be concerned with the production of standard units alone and would supply all other plants with them.

An example of successful specialization can be seen in the production of lubricating equipment at the "Krasnyy metallist" Plant in Leningrad. The plant started producing all types of lubricating equipment in 1946 and at present is putting out high-quality products which are completely fulfilling the needs of all plants of the Ministry of Heavy Machine Building.

The following units and parts can be manufactured in this manner:

1. Tables with self-contained electric drive, which are required in large quantities for rail and structural-steel, skelp, pipe-rolling, and other mills.
2. Conveyer rollers with group drive.
3. Large reducing gears for main drives of mills.
4. Small and medium cylindrical and worm reducers for general purposes.
5. Gear casings with center-to-center distances of 150-350 millimeters, 450-800 millimeters and 850-1,300 millimeters.

The large variety of gear casings which exist are unnecessary and should be eliminated. Therefore, the production of them should be assigned to certain plants and within the ranges of specified sizes. This should be all the more possible since GOST 3705-47, on the basic specifications of a standard series of gear casings, encompasses all types and sizes of rolling mills.

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6. Clutch and elastic couplings.
7. Electromagnetic brakes.
8. Pneumatic cylinders and control apparatus.
9. Sealed bushings for bearings.
10. Crane tread wheels requiring special manufacture.
11. Fittings for high and low-pressure pipelines.
12. Plate chains, springs, metal fixtures, etc.

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